Section 17 Contents

17 SECTION

Water Conservation/Education

UTAH STATE WATER PLAN - WEBER RIVER BASIN PLAN

Water conservation programs and policies can result in decreased water use for some residential, commercial, industrial and agricultural applications.

17.1 Introduction

This section of the *Weber River Basin Plan* discusses and presents water conservation policies, practices, measures and ideas. The discussions and presentations generally focus on conservation relating to residential, commercial, industrial and agricultural water uses.

17.2 Background

Whenever water is discussed at any level or in any forum, the term conservation will most likely be included; especially in the arid west. Water is a finite resource and the demands on its use and consumption are growing at unprecedented rates. However, future water shortages in this location will more likely be the product of long-term drought and infrastructure problems than the product of dramatic increases in domestic and commercial water demands.

The basin is currently experiencing a moderate increase in population growth. The related increase in water demand is offset, to a large extent, by the conversion of high quality irrigation water to residential, commercial and industrial developments. Considering the data presented in Section 9, water shortages are not expected to occur through the year 2020 in most of the basin. The exceptions may be in upstream tributaries such as the Park City and Snyderville Area in Summit County.

The basin has experienced several droughts where annual water supplies have been less than 50 percent of the average annual runoff. The most notable were the drought years of 1961, 1977 and the early 1990s, when local reservoirs were drained to record low levels. Due to sufficient water in storage and careful management, however, few if any water users suffered significant impacts.

17.3 Water Conservation Opportunities

The initial and major use of water was primarily for irrigation of agricultural crops and to support various ranching operations. The current trend is toward the replacement of agricultural-related water uses with municipal and industrial (M&I) demands. This necessitates changes in not only storage, treatment and distribution facilities, but changes in water use practices as well.

17.3.1 Agricultural Water

Although irrigated agriculture is declining, it remains as the largest single water use. Current estimates indicate irrigated agriculture diverts over 446,400 acre-feet. As a result, conservation programs applied to irrigated agriculture have the highest potential of conserving water.

Agricultural water conservation measures are evaluated from two standpoints: one to consider the overall conveyance of water supplies from various sources to individual farms, and a second standpoint to evaluate on-farm methods of applying irrigation water to crops.

Agricultural Water Conveyance Systems - Distribution systems provide water to farms and ranches in addition to a variety of residential, commercial and industrial water users. Efficiencies vary depending on the individual elements making up the overall system.

Open channels are the most common method of conveying water to irrigated agriculture primarily due to their low initial cost of construction. But

operation and maintenance costs are higher to remove weeds and debris from within water conveying channel sections. Excessive water loss can also be a problem resulting in poor overall water conveyance efficiencies. Seepage from open channels can be effectively managed by lining earthen channel sections with concrete or a number of synthetic liners. The amount of water saved by lining open channel or ditch sections may be considerable. Each case is different, however, and must be evaluated on an individual basis.

In recent years, the Weber Basin Water Conservancy District has replaced a number of open channel conveyance facilities within the Weber Basin Project including the Farmington Spillway and other minor ditches. The Ogden River Water Users Association has recently completed a major project to effectively eliminate excessive seepage losses from their Ogden-Brigham City Canal. The project replaced over 5.2 miles of open channel with large diameter concrete pipe primarily in the Ogden and North Ogden bench areas.

Agricultural On-Farm Irrigation Practices - Early settlers applied water to farm and ranch lands by flood irrigation or by using furrow or border irrigation. Recent studies have established the range of efficiency for all irrigation practices at a high of 90 percent to a low of near 40 percent. Irrigation efficiencies can be improved in some cases by optimizing the operation and layout of existing sprinkler or flood irrigation practices.

17.3.2 Municipal and Industrial Water

Municipal and industrial (M&I) water includes institutional, residential, commercial and industrial uses by individual city, county, and private entities or developments. All of these uses are supplied by culinary (potable) and secondary (non-potable) water at a current estimated rate of 172,000 acre-feet per year.

Institutional Water Uses - This includes water for municipal and public recreational buildings and facilities such as schools, health care facilities, golf courses and major landscaped areas such as parks, cemeteries and athletic fields. Water consumption by these facilities may account for 10 to 15 percent of all M&I uses.

An evaluation of water losses from municipal conveyance systems begins with an audit of existing pipelines, canals, ditches and all related hydraulic structures and appurtenances. As field measurements have substantiated, leakage from pipes and open water distribution systems ranges from 5 percent, which is acceptable, to 20 percent, when corrective action should be taken.

Water systems audits effectively identify areas of excessive loss. These audits include 1) an accounting of diversion and delivery records, 2) pressure testing of pipe systems, and 3) installation of groundwater observation wells to assess open channel seepage. Audits can assess overall system efficiencies, locate and determine severe losses, and provide information to develop short-and long-term system rehabilitation and water conservation programs. Annual examinations can update results of previous audits.

Additional conservation measures include audits of existing indoor and outdoor distribution systems, use of sprinkler and drip irrigation systems, and replacement of extensive landscaped areas with minimal water-consuming shrubbery. Some areas can be graveled or hard-surfaced to reduce water needs.

Students panning gold at a Water Fair

Irrigation of large areas such as parks, cemeteries and golf courses can be more efficient and conserve water through use of automated sprinkler systems with moisture probes. This can reduce over application of

water as well as allow irrigation at night, thus reducing evaporation losses.

Residential Water - Residential uses include culinary (potable) and secondary (non-potable) water. Potential residential water savings range from 5 to possibly 50 percent in some cases.

Indoor water demand accounts for about 50 percent of all residential uses. Indoor water use can be reduced by 1) conducting regular inspection of existing toilets, fixtures and plumbing; 2) replacing old high flow toilets with a low flush units; 3) installing low flow shower heads; 4) taking shorter showers; and 5) shutting off faucets while brushing teeth, minimizing flows when using kitchen garbage disposals, and by washing all dishes and clothes in fully loaded machines.

Outdoor water use for landscape irrigation accounts for over 50 percent of all residential demands. This is supplied from either culinary or secondary water. Secondary water should be used for outdoor uses when ever possible. This will reduce the demand for the more expensive culinary water.

Flood irrigation of lawns, gardens and shrubbery is inefficient and results in water loss beyond established root zones. Use of more efficient methods such as sprinkler and drip irrigation systems should be considered. The total amount of water applied per irrigation depends on the time and rate of application. Most residential users are not aware of the amount required or how much is applied. As a result, efficiencies are often low. Evaporation losses can be minimized by irrigating between the hours of 6:00 pm and 10:00 am. An example of the water savings is shown by a study in the Bountiful area. Beginning in 1991, the Bountiful Sub-Conservancy District prohibited the hours of secondary watering between 10:00 am and 6:00 pm. The Division of Water Resources studied the water use in Bountiful for the 10-year period before and 5-year period after the restrictions. They found a 17 percent average decrease in water used after restrictions were implemented.

A significant amount of water can be conserved by making changes in residential landscaping schemes. The Extension Service at Utah State University has information on low water consuming plants and vegetation. Water can be conserved by reducing planted areas or replacing existing landscaping with "hardscapes" such as decks, patios, walkways and play areas for children. Grassed areas should be designed so they are easy to care for and can be irrigated efficiently. Other common outdoor uses include washing of vehicles, driveways, sidewalks and exterior portions of the home. These practices should be reduced as much as possible. In times of drought, outdoor water uses are the first subjected to water restrictions.

Outdoor conservation measures include 1) inspection and repair of outdoor plumbing, 2) use of brooms to clean driveways, sidewalks and patios, 3) elimination of continuously flowing water hoses when washing vehicles, and 4) when children are prone to leave water running, remove handles from outside hose bibs.

Commercial Water - Commercial water uses include those by small retail businesses such as grocery stores and gas stations. The largest commercial water users are restaurants, laundries, linen suppliers, hotels, commercial office buildings and car washes. Conservation measures include water audits of existing distribution and handling systems, replacement of high volume fixtures with more efficient models, recycling where possible and reduction of high use landscaped areas.

Industrial Water - Each industrial business or facility has its own unique water use and related in-plant process characteristics and so must be evaluated on a case by case basis. Water conservation measures currently used in similar situations should be put into practice to the extent possible. Many of the water conservation measures applicable for commercial businesses apply to industry. Water audits are effective in identifying losses, and they should be conducted on a regular basis. Specific improvements to conserve water should be identified and implemented as part of an overall program to improve manufacturing processes.

17.3.3 Wastewater Reuse

Effluent from wastewater treatment facilities represents a significant source of secondary irrigation water that is available. In other regions of the United States, wastewater is routinely utilized to irrigate golf courses, landscaped strips along state and federal highways, municipal parks and other isolated public landscaped areas.

Utilizing treated wastewater as a source of secondary irrigation water allows for a more efficient use of the overall water supply by freeing up substantial volumes of higher quality water for culinary uses. The potential for wastewater utilization as irrigation water should be investigated to determine the criteria, requirements, and costs to install pumping stations, upgrade treatment and

distribution systems from each of the existing treatment facilities.

Current state and federal regulations limit the use of treated wastewater in situations that would result in direct human contact, either by aerosols generated from sprinkler discharges or by ingestion of foods irrigated with wastewater effluent. However, state and federal regulations allow treated wastewater effluent to be used as irrigation water as long as the stated conditions are met regarding human contact.

Fourteen wastewater treatment facilities are currently operating with an estimated total effluent discharge of over 89,100 acre-feet per year. The Central Weber Sewer Improvement District discharges treated effluent into a local agricultural irrigation canal. Other treated wastewater effluent is discharged to either the upper Weber River system or directly to the Great Salt Lake.

Table 17-1
IMPACTS OF CONSERVATION ON M&I WATER DEMANDS
DAVIS AND WEBER COUNTIES

Conservation Scenarios	1992	Demand 2000	2010	2020	Change 2000	2010	2020
		(acre-feet)				(percent)	
Base Case	78,300	82,200	98,800	117,300	5.0	26.1	49.7
Plumbing		79,200	91,300	105,100	-3.7	-7.6	-10.4
Xeriscaping		82,100	98,300	116,000	-0.1	-0.5	-1.1
Pricing 10%		80,000	96,000	114,000	-2.7	-2.7	-2.7
Combination		77,000	88,400	101,100	-6.3	-10.5	-13.8

Source: Wasatch Front Water Demand/Supply Model, November 1996.

17.3.4 Water Conservation Impacts

The Wasatch Front Water Demand/Supply Model was used to project future water demands using current conservation trends along the Wasatch Front area in Weber and Davis counties. These projections are presented in Table 17-1.

17.3.5 Water Conservation Advisory Board

The recent publication of various water conservation recommendations by the Utah Water Conservation Advisory Board offers a number of programs and means to effectively conserve a substantial percentage of M&I water. These recommendations include 1) the development of water management and conservation plans by major water provider agencies, 2) the reduction of secondary water by replacing high-water consuming landscaping with landscaping that uses less water, 3) better overall management of water intensive businesses and large conveyance systems, 4) the implementation of water pricing measures/policies, and 5) the use of low flow water fixtures within new residential homes and commercial buildings.

17.4 Conservation Requirement on Federal Water Reclamation Projects

By federal law (Public Law 97-293), all agencies charged with the operation and maintenance responsibilities of a federal water reclamation project are required to submit an *Annual Water Conservation Plan* (AWCP) to the Bureau of Reclamation. In the Weber River Basin, AWCPs are submitted by the Weber Basin Water Conservancy District as the agency for the Weber Basin Project and by the Ogden River Water Users Association as the agency for the Ogden River Project. To meet these water conservation requirements, each agency must include the following in their individual AWCP: definite goals, appropriate water conservation measures, and a time schedule for meeting established water conservation objectives.

Water conservation projects recently undertaken by the Weber Basin Water Conservancy District include the reconstruction of the Gateway Canal; piping of miscellaneous irrigation laterals on the Willard Reservoir distribution system; and scheduled maintenance and replacement of impervious linings at existing open ditches, laterals and canals on an as-needed basis.

The Ogden River Water Users' Association has recently completed a number of conservation projects, including the replacement of 5.2 miles of 75-inch steel

piping in Ogden Canyon, replacement of approximately 27,900 feet (5.3 miles) of the concrete-lined Ogden-Brigham City Canal with 48-to 78-inch reinforced concrete pipe, and replacement of 12 measuring weirs delivering water to irrigators. These projects replace old piped or open channel conveyance systems that have moderate to severe leakage problems.

17.5 Issues and Recommendations

Water conservation issues center around the implementation of various water conservation programs and the continued systematic replacement of old water distribution facilities prone to excessive water loss.

17.5.1 Efficient Distribution Systems

Issue - Old, deteriorated and inefficient water conveyance and distribution systems lose significant amounts of water.

Discussion - Large distribution systems convey hundreds of thousands of acre-feet of water to various residential, commercial and agricultural end-users throughout the Weber River Basin. As a result, the improvement of conveyance efficiencies by only a few percentage points would account for thousands of acre-feet of water savings annually.

An annual water system accounting of water produced or purchased compared with water delivered to customers and system uses should give an indication of systems efficiency. Water system accounting requires measuring all water uses and the collection and use of this data.

Recommendation - All water utilities should set standards (best management practices) for an annual water system accounting that will quantify water systems losses and trigger repair, replacement and maintenance programs.

17.5.2 Water Pricing Incentives

Issue - Water pricing may promote conservation.

Discussion - Water pricing is an effective tool in promoting water conservation by providing an incentive to decrease water consumption. Currently, most water pricing structures incorporate a constant volume with the basic rate and constant overage charges for use above this rate. If rates are very low, water users will not feel the need to carefully use water as the cost is insignificant in their minds.

Some water providers fear that raising rates will decrease water sales and thus revenues for the utility. In the range of prices for water, the price-demand relationship is not very elastic. While water use may decrease with increased rates, a 10 percent increase in rates may only result in a 2 percent decrease in use and the net effect may be a small increase in revenues. Developing a pricing structure that takes this into account may result in a natural revenue neutral picture while still encouraging conservation.

Water pricing for conservation focuses on reducing demand through various pricing mechanisms. The primary mechanism available for conserving water is to structure the way water providers charge for water so that an incentive exists for customers to use less. The least effective water rate structure for inducing conservation is one where the price gets less as the amount of water used increases. This is called a decreasing block rate. More effective is the rate structure that charges the same amount (price) for all units, i.e., 1,000 gallons. This is called a flat rate. Most effective is the rate that increases as usage increases. This is called an increasing block rate. Under this approach, the customer is allotted enough water to serve the average family's indoor needs at some base price per 1,000 gallons. Any usage beyond the base allotment is priced at a higher rate. Some providers set prices at higher rates for additional increments of water to assure that those who place the highest demand on the delivery system pay a larger share of the operating and capital costs.

The increasing block rate has been used at Kaysville in Davis County to encourage residents to use the pressurized irrigation system and reduce the use of treated water from the culinary system. People can still use culinary water to irrigate lawns and gardens, but at a much higher cost than they would pay if using cheaper irrigation water from the secondary system. Examples of the stated rate structures are given in Figures 17-1 and 17-2.

Recommendation - Local provider agencies should implement a pricing structure that encourages water conservation. ❖

Figure 17-1
COMMON RATE STRUCTURES

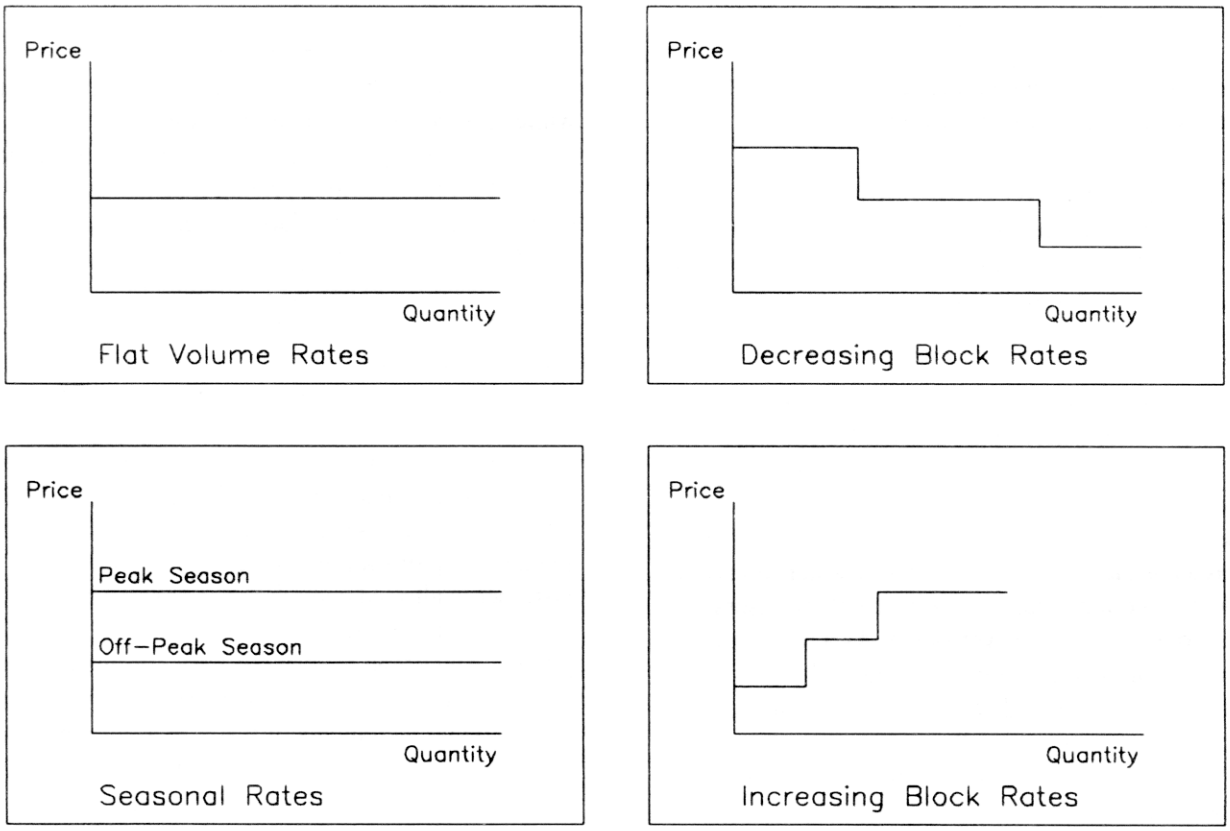

Figure 17-2
KAYSVILLE INCREASING BLOCK RATE